| FORM PTO-1390 (Modified) (REV 12-95)    U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE | ATTORNEY'S DOCKET NUMBER |
|---|---|
| **TRANSMITTAL LETTER TO THE UNITED STATES** | 1350 |
| **DESIGNATED/ELECTED OFFICE (DO/EO/US)** | U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR |
| **CONCERNING A FILING UNDER 35 U.S.C. 371** | **09/673313** |

| INTERNATIONAL APPLICATION NO. **PCT/DE 99/00481** | INTERNATIONAL FILING DATE **FEBRUARY 23, 1999** | PRIORITY DATE CLAIMED **APRIL 16, 1998** |
|---|---|---|

TITLE OF INVENTION

**METHOD FOR REPRESENTING MOVING OBJECTS IN BIT-MAPPED FORMAT ON A MATRIZLIKE DISPLAY DEVICE**

APPLICANT(S) FOR DO/EO/US

**Thomas GEISLER**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.

2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.

3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).

4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))

     a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).

     b. ☒ has been transmitted by the International Bureau.

     c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).

6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).

7. ☐ A copy of the International Search Report (PCT/ISA/210).

8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))

     a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).

     b. ☐ have been transmitted by the International Bureau.

     c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.

     d. ☐ have not been made and will not be made.

9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).

11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).

12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

**Items 13 to 18 below concern document(s) or information included:**

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

15. ☒ A **FIRST** preliminary amendment.

     A **SECOND** or **SUBSEQUENT** preliminary amendment.

16. ☐ A substitute specification.

17. ☐ A change of power of attorney and/or address letter.

18. ☒ Certificate of Mailing by Express Mail

19. ☐ Other items or information:

EF 216 019 739 US

PCTUS1/REV03

| U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR) **09/673513** | INTERNATIONAL APPLICATION NO. **PCT/DE 99/00481** | ATTORNEY'S DOCKET NUMBER **1350** |
|---|---|---|

20.       The following fees are submitted:.

| | CALCULATIONS   PTO USE ONLY |
|---|---|

**BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5)) :**

☐   Search Report has been prepared by the EPO or JPO . . . . . . . . . . . .   **$930.00**

☐   International preliminary examination fee paid to USPTO (37 CFR 1.482) . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .   **$720.00**

☐   No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) . . . . . .   **$790.00**

☒   Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO . . . . . . . . .   **$1,070.00**

☐   International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) . . . . . . . . . .   **$98.00**

**ENTER APPROPRIATE BASIC FEE AMOUNT =**   **$1,000.00**

Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).   **$0.00**

| CLAIMS | NUMBER FILED | NUMBER EXTRA | RATE | |
|---|---|---|---|---|
| Total claims | 9       - 20 = | 0 | x   $18.00 | $0.00 |
| Independent claims | 1       - 3 = | 0 | x   $80.00 | $0.00 |
| Multiple Dependent Claims **(check if applicable)**. | | | ☐ | $0.00 |

**TOTAL OF ABOVE CALCULATIONS   =**   **$1,000.00**

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable)**.   ☐   **$0.00**

**SUBTOTAL   =**   **$1,000.00**

Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +   **$0.00**

**TOTAL NATIONAL FEE   =**   **$1,000.00**

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable)**.   ☐   **$0.00**

**TOTAL FEES ENCLOSED   =**   **$1,000.00**

| Amount to be: refunded | $ |
|---|---|
| charged | $ |

☐   A check in the amount of                        to cover the above fees is enclosed.

☒   Please charge my Deposit Account No.   **19-4675**   in the amount of **$1,000.00**   to cover the above fees.
A duplicate copy of this sheet is enclosed.

☒   The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment
to Deposit Account No.   **19-4675**   A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

**STRIKER, STRIKER & STENBY**
**103 EAST NECK ROAD**
**HUNTINGTON, NEW YORK 11743**

SIGNATURE

**MICHAEL J. STRIKER**
NAME

**27233**
REGISTRATION NUMBER

**OCTOBER 13, 2000**
DATE

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner:                    Group:              Attorney Docket # 1350


Applicant(s)  :  GEISLER, T.

Serial No.    :

Filed         :  Simultaneously

For           :  METHOD FOR REPRESENTING MOVING
                 OBJECTS IN BIT-MAPPED FORMAT ON A
                 MATRIXLIKE DISPLAY DEVICE


SIMULTANEOUS AMENDMENT

October 12, 2000

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

S I R S:

        Simultaneously with filing of the above identified application
please amend the same as follows:


        In the Claims:


Claim 3 line 1 delete "or 2".

Claim 4 line 1 delete "2 or 3".

Claim 5 line 1 delete "one of the foregoing claims", substitute with "claim 1".

Claim 8 line 1 delete "one of the foregoing claims", substitute with "claim 1".

Claim 9 line 1 delete "one of the foregoing claims", substitute with "claim 1".

REMARKS:

This Amendment is submitted simultaneously with filing of the above identified application.

With the present Amendment applicant has amended the claims so as to eliminate their multiple dependency.

Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,

Michael J. Striker
Attorney for Applicant(s)
Reg. No. 27233

METHOD FOR REPRESENTING MOVING OBJECTS IN BIT-MAPPED
FORMAT ON A MATRIXLIKE DISPLAY DEVICE

PRIOR ART

The present invention relates to a method for
representing moving objects in bit-mapped format on a
matrix- like display device.

Although it can be employed on arbitrary objects
in bit-mapped format and arbitrary matrixlike display
devices, the present invention and the problems
fundamental to it will be explained below with regard to
a dashboard display device, or monitor, located on board
a motor vehicle, for representing a pointer.

For a fluid or sliding representation, that is, a
representation of pointer animation without perceptible
skipping on a dashboard monitor on board a motor
vehicle, it is generally necessary to go to considerable
computation effort, which requires the use of dedicated
graphics hardware and software.

The following operations must typically be
performed.

The pointer, for instance the speedometer pointer,
which is present in the form of a bit map, must be
rotated by computation into angular positions
corresponding to various speeds.

In this bit map, the pointer has much higher
resolution (supersampling) than in the case of the
actual representation on the display device, so that

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then, in other words after the computational rotation, a
filtration in the local region for the sake of edge
smoothing (anti-aliasing) can be appropriately
performed.  Typically, one ray of 3 x 3 = 9 pixels in
the bit map corresponds to a single pixel of the display
device.  Each pixel can assume 256 bit values for each
individual one of the three fundamental colors, red,
green and blue.

Furthermore, a computational superposition of the
pointer, in each of its angular positions, with a
suitable background image such as a scale is necessary.

The problems fundamental to the present invention
are in general that this computation effort in
representing objects in bit-mapped format on a
matrixlike display device using conventional hardware
with a structure similar to a personal computer, cannot
be accomplished fast enough.  As a result, the object to
be represented moves along the predetermined path curve
slowly and in visible stages, which makes the observer
uneasy.

In the prior art, anti-aliasing processing with
hardware or software can be executed sufficiently fast
only in the case of edge smoothing of objects present in
vector data form, such as a line or a circle, or in the
representation of filler patterns, which represent the
repetition of a relatively small-area basic pattern.

However, the only sensible way to represent
pointers, including their hubs, with arbitrary color
patterns and shapes, as is desired by customers and
designers, is in the form of a bit map.

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ADVANTAGES OF THE INVENTION

The method according to the invention for
representing objects in bit-mapped format on a
matrixlike display device in accordance with claim 1 has
the advantage that it reduces the online computation
effort for representing objects in bit-mapped format on
a matrixlike display device considerably and thus makes
a flowing representation without skipping possible on
conventional hardware.  Arbitrary graphical objects of
high quality can be utilized for animation purposes.
All of these objects can be stored in the general form
of a bit map and need not be described inconveniently in
vector form.

The concept on which the present invention is
based is that the time-consuming calculations can be
performed in advance offline for a certain number of
different object representations along a corresponding
path curve.  The object representations, which are thus
present in preprocessed positions at discrete locations,
are each stored as a respective bit map.  During the
running time of the representation program, only the bit
map that is to be displayed for situational reasons is
read out of the memory and displayed.  Expediently, this
bit map is superimposed on the also preprocessed and
stored background image.

Advantageous refinements and improvements to the
method defined by claim 1 are found in the dependent
claims.

In accordance with a preferred refinement, in the
calculation of the plurality of bit maps in advance, a

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filtration is performed for the sake of edge smoothing in the local region.  This has the advantage that even this time- consuming calculation operation can be performed offline.

In a further preferred refinement, an associated precalculated and pre-stored background image is superimposed on the various object representations. This is expedient, since the background image changes substantially more seldom than the foreground image that includes the object moving along the path curve.

In a further preferred refinement, the spatial difference between adjacent object representations along the path curve, which are precalculated and pre-stored as a respective bit map, is substantially smaller than the applicable object representations.  In other words, an appropriate correlation between two adjacent object representations along the path curve must prevail, if appropriate results are to be attained.  A contrary example would be two pointer positions, one indicating "12 o'clock" and the other "3 o'clock".

In another preferred refinement, for displaying object representations which are located between two object representations having a respective pre-calculated and pre- stored bit map, a paired interpolation between the corresponding pixel values (picture elements) is performed.  By means of this kind of interpolation process, the object path resolution can be made arbitrarily fine.  Furthermore, this saves space in memory, which is needed for the precalculated bit maps.

In a further preferred refinement, the pixel values are present separately in accordance with certain colors, preferably the three fundamental colors of red, green and blue, and the interpolation is performed separately for each color.

In a further preferred refinement, for the interpolation, the mean value for each pixel, weighted in accordance with the intermediate position, is calculated. This corresponds to a simple linear interpolation as a function of the position of the intermediate position.

In a further preferred refinement, a compression of the pre-stored bit map data is performed. This then leads to good results especially if large image areas with a single- color background are available.

DRAWINGS

Exemplary embodiments of the invention are shown in the drawings and described in further detail below.

Shown are:

Fig. 1a, a bit map $B(i)$ for representing a pointer in bit-mapped format on a matrixlike display device of a dashboard instrument on an $i^{th}$ point of a path curve;

Fig. 1b, an intermediate bit map $Z(i, a)$, interpolated linearly in online operation, for representing a pointer in bit-mapped format on a matrixlike display device of a dashboard instrument at an $(i + a)^{th}$ point of the path curve, where $a = 0.5$; and

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Fig. 1c, a bit map B(i + 1) for representing a
pointer in bit-mapped format on a matrixlike display
device of a dashboard instrument at an adjacent (i +
1)$^{th}$ point of the path curve.

DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

One embodiment of the method according to the
invention for representing objects in bit-mapped format
on a matrix- like display device will be described below
with reference to Figs. 1a-1c, in terms of its use for
representing a pointer on a dashboard display device, or
dashboard monitor, on board a motor vehicle.

First, a calculation of a plurality of bit maps
for a certain number of different pointer
representations along a predetermined path curve, namely
along a circular scale, for instance, as a background is
done offline. Already in these advance calculations of
the plurality of bit maps, a filtration is performed for
the sake of edge smoothing in the local region, so as to
make the later online calculations as slight as possible
and thus make the display speed as fast as possible.

The spatial difference between adjacent pointer
representations along the path curve, which are
precalculated and pre-stored as a respective bit map, is
substantially smaller than the applicable pointer
representations. The precise difference must be
optimized from one case to another to suit the various
pointer representations.

The calculated plurality of bit maps is stored in
memory in advance in a memory device that is part of the

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dashboard monitor. In general, a compromise must be made between the available memory space and the desired fine resolution.

In online operation, during motor vehicle travel, the execution of a representation processing is then done, with a display sequence of pointer representations along the path curve, by reading and displaying suitably stored bit maps. If the pointer is the speedometer pointer, it is accordingly the pointer bit map corresponding to the instantaneous speed that is read and displayed at a given time.

The corresponding scale, which is an associated precalculated and pre-stored background image, has the pointer representation superimposed on it.

Let it be assumed as an example that in Fig. 1a a bit map B(i) for representing the pointer in bit-mapped format on the matrixlike display device of the dashboard instrument is shown at an $i^{th}$ point of the path curve, specifically to indicate 120 km/h.

Let it also be assumed that in Fig. 1b, a bit map B(i + 1) for representing the pointer in bit-mapped format on the matrixlike display device of the dashboard instrument is shown at an adjacent $(i + 1)^{th}$ point of the path curve, specifically to indicate 125 km/h.

A bit map for representing a pointer in bit-mapped format on the matrixlike display device of the dashboard instrument at an intervening point of the path curve, specifically to indicate 122.5 km/h, is not stored in memory.

In this embodiment of the invention, a display of
such a pointer representation located between two
pointer representations each with a precalculated and
pre-stored bit map, is done by means of a paired
interpolation between the corresponding pixel values.
The pixel values are present separately in accordance
with certain colors, preferably the three fundamental
colors of red, green and blue, and preferably the
interpolation is performed separately for each color.

In this example, however, for the sake of
simplicity let it be assumed that the pointer
representation is done in only one fundamental color
each, or that the values for all three fundamental
colors are the same. The resultant 256 values are
located between 0 and 255. 0 designates the darkest
value and 255 the brightest value. It should also be
noted that for the sake of simplicity, not all the pixel
values are shown in the bit maps of Figs. 1a-1c.

Fig. 1b is an intermediate bit map Z(i, a)
interpolated linearly in online operation, for
representing the pointer in bit-mapped format on the
matrixlike display device of the dashboard instrument at
an $(i + a)^{th}$ point of the path curve; in this case, a =
0.5, because 122.5 km/h is located precisely in the
middle between 120 km/h and 125 km/h.

The pixel values $Z_{mn}(i, a)$ of the intermediate bit
map Z(i, a) can accordingly be calculated as followed:

$$Z_{mn}(i, a) = (1 - a) * B_{mn}(i) + a * B_{mn}(i + 1) \qquad (1)$$

where m is the line indicator and n is the column

indicator.  In other words, the pixel values $Z_{mn}(i, a)$ are precisely the mean values of the pixel values $B_{mn}(i)$ and $B_{mn}(i + 1)$.

Although the present invention has been described above in terms of a preferred exemplary embodiment, it is not limited to that but instead can be modified in manifold ways.

In particular, it is understood that instead of the above linear interpolation, any other interpolation is possible.

Nor is the interpolation absolutely necessary; it depends on the memory capacity and on the desired fine resolution.  For example, it is not necessary to perform an interpolation below a certain threshold difference, which in the above example can be 1 km/h.

To save storage space, a compression/decompression of the pre-stored bit map data, that is, pointer data and/or background data, can be employed.

CLAIMS

1. A method for representing objects in bit-mapped format on a matrixlike display device, having the following steps:

calculation of a plurality of bit maps for a certain number of various object representations along a predetermined path curve in advance;

storage of the plurality of bit maps in memory in advance; and

execution of a representation processing with a display sequence of object representations along the path curve by reading and displaying correspondingly memorized bit maps.

2. The method of claim 1, characterized in that in the calculation of the plurality of bit maps in advance, a filtration is performed for the sake of edge smoothing in the local region.

3. The method of claim 1 or 2, characterized in that an associated precalculated and pre-stored background image has the various object representations superimposed on it.

4. The method of claim 1, 2 or 3, characterized in that the spatial difference between adjacent object representations along the path curve, which are precalculated and pre-stored as a respective bit map, is substantially smaller than the applicable object

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representations.

5. The method of one of the foregoing claims, characterized in that for displaying object representations, which are located between two object representations having a respective precalculated and pre-stored bit map, a paired interpolation between the corresponding pixel values is performed.

6. The method of claim 5, characterized in that the pixel values are present separately in accordance with certain colors, preferably the three fundamental colors of red, green and blue, and the interpolation is performed separately for each color.

7. The method of claim 6, characterized in that for the interpolation, the mean value for each pixel, weighted in accordance with the intermediate position, is calculated.

8. The method of one of the foregoing claims, characterized in that a compression of the pre-stored bit map data is performed.

9. The method of one of the foregoing claims, characterized in that the method is employed on a dashboard display device, located on board a motor vehicle, for representing a pointer.

ABSTRACT

The invention creates a method for representing
moving objects in bit-mapped format on a matrixlike
display device, having the following steps:  calculation
5     of a plurality of bit maps for a certain number of a
various object representations along a predetermined
path curve in advance; storage of the plurality of bit
maps in memory in advance; and execution of a
representation processing with a display sequence of
10    object representations along the path curve by reading
and displaying correspondingly memorized bit maps.

$B(i) =$

| 255 | 239 | 176 | 176 | 239 | 255 |
|---|---|---|---|---|---|
| 255 | 176 | 0 | 0 | 176 | 255 |
| -- | -- | 0 | 0 | -- | -- |
| -- | -- | 0 | 0 | -- | -- |
| -- | -- | 0 | 0 | -- | -- |
| -- | -- | 0 | 0 | -- | -- |

Fig. 1a

$Z(i,a) =$

| 255 | 247 | 197 | 135 | 167 | 236 |
|---|---|---|---|---|---|
| 255 | 216 | 57 | 0 | 88 | 213 |
| -- | -- | -- | 0 | -- | -- |
| -- | -- | -- | 0 | -- | -- |
| -- | -- | 0 | 0 | -- | -- |
| -- | -- | 0 | 0 | -- | -- |

Fig. 1b

$B(i+1) =$

| 255 | 255 | 217 | 94 | 94 | 217 |
|---|---|---|---|---|---|
| 255 | 255 | 113 | 0 | 0 | 170 |
| -- | -- | -- | 0 | 0 | -- |
| -- | -- | -- | 0 | 0 | -- |
| -- | -- | 0 | 0 | -- | -- |
| -- | -- | 0 | 0 | -- | -- |

Fig. 1c

<u>DECLARATION AND POWER OF ATTORNEY FOR NATIONAL STAGE OF PCT PATENT APPLICATION</u>

As a below-named inventor, I hereby declare that:

Thomas GEISLER

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD FOR REPRESENTING MOVING OBJECTS IN BIT-MAPPED FORMAT ON A MATRIXLIKE DISPLAY DEVICE** the specification of which was filed as PCT International Application number PCT/DE 99/00481 on February 23, 1999.

I hereby state that I believe the named inventor or inventors in this Declaration to be the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

<u>Prior foreign application(s):</u>                                              <u>Priority claimed:</u>

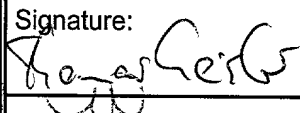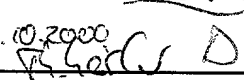| | | | | |
|---|---|---|---|---|
| <u>198 16 795.4</u> | <u>GERMANY</u> | <u>APRIL 16, 1998</u> | <u>X</u> | |
| (Number) | (Country) | (Date filed) | Yes | No |
| | | | | |
| (Number) | (Country) | (Date filed) | Yes | No |

As a named inventor, I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Michael J. Striker, Reg. No. 27233

Direct all telephone calls to Striker, Striker & Stenby at telephone no.: (631) 549 4700 and address and all correspondence to:

STRIKER, STRIKER & STENBY
103 East Neck Road
Huntington, New York 11743
U.S.A.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statement may jeopardize the validity of the application or any patent issued thereon.

| Signature: *Thomas Geisler* | Date: 12.10.2000 | Residence and Full Postal Address: ~~Adlerstrasse 59~~ *LEOPOLDSTRASSE 41* ~~76137 Karlsruhe~~ *76133 KARLSRUHE* Germany *12.10.2000* |
|---|---|---|
| Full Name of First or Sole Inventor: Thomas GEISLER | Citizenship: GERMAN | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Second Inventor: | Citizenship: | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Third Inventor: | Citizenship: | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Fourth Inventor: | Citizenship: | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Fifth Inventor: | Citizenship: | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Sixth Inventor: | Citizenship: | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Seventh Inventor: | Citizenship: | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Eighth Inventor: | Citizenship: | |
| Signature: | Date: | Residence and Full Postal Address: |
| Full Name of Ninth Inventor: | Citizenship: | |